To: Dr. Gartman from Dr. Bushland

From: Dr. Bushland ~~from~~ to Dr. L.Henderson or Dr. W.Klassen of ARS, Plant Science of Entomology in Beltsville, Maryland.

PROPOSAL FOR SCREWWORM RESEARCH UNDER CONTINGENCY FUNDS, FY 1973

1. Problem:

The ARS needs to expand screwworm research to assist APHIS in a critical eradication problem. The eradication program encountered severe problems in controlling screwworms in Texas in the summer and fall of 1971, and screwworm control failed in Texas and Oklahoma in 1972. The ARS Mission laboratory could not provide answers to questions as to whether wild flies had developed a form of genetic resistance to the sterile male technique or whether there was no change in the wild flies but rather a deterioration in the field competitiveness of sterilized flies. To obtain such answers requires greatly expanded field research in Texas and a renewal of intensified research in Mexico.

The only way in which critical field studies can be restored is through an expansion of the budget to return to the capabilities of the laboratory as it was originally organized in FY 1962 at an annual budget of $200,000.

2. Plan of Work:

Redirect emphasis from long term basic research and routine support studies to problem-oriented emergency research. This has already been started by the June 1972 transfer of a GS-11 laboratory entomologist, Joyce A. DeVaney, to College Station, Texas, and replacing her with a GS-13 field entomologist, Calvin Jones, transferred from Lincoln, Nebraska. In August, 1972, Dr. R. C. Bushland, GS-16 research entomologist, who did the original experiments on screwworm sterilization,

was returned to leadership of screwworm research by transfer back from Fargo, North Dakota. O. H. Graham, GS-15 research entomologist at Kerrville, has been detailed for up to 6 months' TDY at Mission to reemphasize field research in Mexico. D. E. Hopkins, GS-11 agricultural research technician, and Charles Dawkins, GS-9 biological aid, have been detailed from Kerrville for up to 6 months TDY at Mission. Their prime duty is to assist in emergency field experiments and to train 3 new temporary appointees in the technician skills needed for intensified field research.

3. Actions Taken or Anticipated:

The transfer of Dr. Bushland, the detailing of Dr. Graham, Mr. Hopkins, and Mr. Dawkins have already been done in anticipation of increased funding. Expanded field work is now underway and employment of 3 new temporary helpers (at WB-4 or 5 or GS-3 or 4 levels) is being requested. There will be a minimum requirement of $82,900 contingency funds in addition to the regular appropriation. Contingency funds will be spent as follows:

a.	Personal Services		
	(1) Three technicians	$16,000	
	(2) Parttime laborers	2,500	
	(3) Fringe benefits	1,400	
	Sub-Total		$19,900
b.	Travel--Domestic		
	(1) Regular (includes per diem for TDY)		10,000
	(2) Meetings		-0-
c.	Travel--Foreign		
	(1) Regular		10,000
	(2) Meetings		-0-
d.	Supplies		
	(1) Chemicals, traps, field cages		8,000
	(2) Animal feed		5,000
	(3) Animal pens		2,000
	(4) Gas, oil, vehicular maintenance		5,000
e.	Equipment - 6 vehicles (trucks)		18,000
f.	Construction & repairs		5,000
	TOTAL		$82,900

4. Type of Work:

   a. Emergency research to discover the cause of current eradication problems.

   b. Develop new and more vigorous strains of screwworm flies to cope with the present situation.

   c. Conduct monitoring studies on the field performance of whatever kind of sterile fly that APHIS releases.

   d. Conduct ecological studies in southern and western Mexico in preparation for the joint US-Mexico program scheduled to be activated in FY 1974.

   e. Conduct genetic studies on flies from all over Mexico so that proper stocks will be available to APHIS for the expanded program.

5. Estimated Duration: 3-5 years.

6. Financing After 1973:

   Budget increase of 3 SMY's required to support a 40 million dollar expanded eradication program in Mexico.

Prepared by: R. C. Bushland

Date: September 29, 1972

R. C. Bushland

E. A. Taylor

Copy to: A. W. Cooper, New Orleans
Waldemar Klassen, Beltsville
L. Henderson, Beltsville

1. Egg mass survey -

2. —

3. —

Dr. Graham

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas 78572

August 24, 1972

LINES OF RESEARCH TO BE INVESTIGATED AT MISSION, TEXAS

1. Working in closest cooperation with APHIS:

a. Intensively investigate all current operating procedures for mass rearing, sterilization and distribution to uncover any flaws in presently used techniques which detract from the vigor and competitiveness of released sterile flies.

b. Develop alternative procedures to correct any deficiencies in biological effectiveness of current techniques and prove any innovations by thorough laboratory and field tests.

c. Anticipate and solve new entomological problems (many will certainly arise) associated with an aboard-ship sterile fly factory to be used in the Mexico program now getting started.

2. Study wild screwworms in their varied native environments in the U. S. and Mexico. Investigate all sorts of ecological situations in which wild flies survive and in which sterile flies must compete for mates. Collect new strains from these environments and establish them as laboratory colonies. Test these strains in the laboratory and field for vigor and mating competiveness. From these tests select new strains for the sterile male program with data to prove that they are adapted wherever special strains are needed in the U. S. and Mexico.

3. During the past 9 years in which fly populations have been suppressed but not eradicated in northern Mexico, genetic selection pressures have been operating on the wild fly population. Those wild flies susceptible to the sterile male technique have been controlled while those resistant have reproduced to create the current wild population. It may be that something analogous to insecticide resistance has developed. Therefore, it is necessary to investigate whether there have been genetic changes to make the wild population resistant to the sterile male technique. Such genetic changes could be:

a. Loss of monogomous response so that a wild female may mate with both sterile and normal males and hence lay fertile eggs.

b. Earlier sexual maturity so that the flies from a single infested animal do not disperse so widely before mating and hence do not have so much time to intermingle with sterile flies.

c. A change in the dispersal behavior of virgin flies so that males and females may stay in the vicinity of their emergence until after mating.

These points of reproductive behavior will be investigated. There must also be a continuous alertness for and a study of any other isolating mechanisms that might interfere with the mixing of sterile and wild flies.

RCB

R. C. Bushland
Acting Research Leader

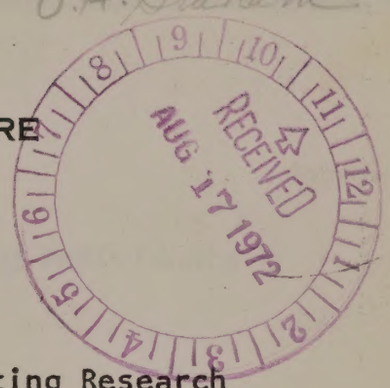
- Cotaxtla research -

1. Comparison of 4 strains of S.W. flies, wound-reared, to determine sexual maturity of males & females -
   a. Chiapas strain
   b. Tobasco strain
   c. Oaxaca strain
   d. Cryptal-NTS strain

2. Operate sheep pens near southern edge of drop zone - somewhere between Tempoal to Misantla.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

Washington, D.C. 20250 AUG 14 1972



Subject: Screwworm Suppression: Reinforcement of Supporting Research

To: A. W. Cooper

E. R. Glover

H. O. Graumann

For more than one year considerable difficulties have been experienced in preventing reinvasion of the Southwest by screwworms. The effort to eliminate the screwworm from the Island of Vieques did not succeed. More screwworms are now present in the United States than at any time since the program began.

Many reasons have been suggested for the failure of the program during the past year. Clearly, the weather has favored screwworm development. Nevertheless, there is a strong likelihood that other important factors are involved, so that a control failure may occur again next year, even if weather conditions are normal. Therefore, there is an urgent need to increase the research support of the screwworm program in order to place the program on a firm footing in time for the next fly season.

In order to augment the research program, the following actions will be taken:

1. Effective immediately, Dr. R. C. Bushland will serve as Acting Research Leader of the ARS research unit at Mission, Texas. Dr. Bushland will leave as soon as possible on detail to Mission, Texas. A personnel action is in preparation to make this a career assignment for Dr. Bushland. He will be directly responsible to Mr. E. A. Taylor, Area Director. Dr. Bushland will be responsible for setting research priorities, and for supervising and coordinating all pertinent research. His major responsibility will be to develop and execute a research program which is likely to lead to the implementation of fully adequate remedial measures in advance of the next fly season.

2. Dr. M. M. Crystal will make every effort to assist Dr. Bushland in the speedy development and initiation of this program.

3. Dr. H. O. Graham will leave as soon as possible on detail for 3-6 months to Mission, Texas. He will participate on a full-time basis in the research program developed under the leadership of Dr. Bushland.

4. At the discretion of Dr. Bushland, the following individuals will be detailed to Mission:

Mr. D. E. Hopkins, Kerrville, Texas

Mr. C. C. Dawkins, Kerrville, Texas

Mr. G. E. Spates, College Station, Texas

5. The National Program Staff will advise me on the need to support this augmented research program from the Administrator's Contingency Fund. In addition, the National Program Staff will keep me apprised of research progress and advise me if other measures are needed.

s/ T. W. Edminster

cc:
J. R. Johnston
C. H. Schmidt
E. A. Taylor
R. C. Bushland
H. O. Graham
M. M. Crystal
R. O. Drummond
E. F. Knipling
H C Cox
R. A. Hoffmann

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas 78572

August 24, 1972

1. Working in closest cooperation with APHIS

a. Intensively investigate all current operating procedures for mass rearing, sterilization and distribution to uncover any flaws in presently used techniques which detract from the vigor and competitiveness of released sterile flies.

b. Develop alternative procedures to correct any deficiencies in biological effectiveness of current techniques and prove any innovations by thorough laboratory and field tests.

c. Anticipate and solve new entomological problems (many will certainly arise) associated with an aboard-ship sterile fly factory to be used in the Mexico program now getting started.

2. Study wild screwworms in their varied native environments in the U. S. and Mexico. Investigate all sorts of ecological situations in which wild flies survive and in which sterile flies must compete for mates. Collect new strains from these environments and establish them as laboratory colonies. Test these strains in the laboratory and field for vigor and mating competiveness. From these tests select new strains for the sterile male program with data to prove that they are adapted wherever special strains are needed in the U. S. and Mexico.

3. During the past 9 years in which fly populations have been suppressed but not eradicated in northern Mexico, genetic selection pressures have been operating on the wild fly population. Those wild flies susceptible to the sterile male technique have been controlled while those resistant have reproduced to create the current wild population. It may be that something analogous to insecticide resistance has developed. Therefore, it is necessary to investigate whether there have been genetic changes to make the wild population resistant to the sterile male technique. Such genetic changes could be:

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R. C. Bushland
Acting Research Leader

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas 78572

August 24, 1972

Ing. Hermenegildo Velasco P.
Instituto Nacional de Investigaciones Agricoles
Campo Cotaxtla
Apdo. Postal 429
Veracruz, Mexico

Estimado Ing. Velasco:

A number of changes have recently been made in the organization of the screwworm research program here at Mission so that USDA will be able to provide adequate research support for the upcoming Mexico-U.S. Joint Screwworm Eradication Program. Dr. F. C. Bushland is being transferred from Fargo, North Dakota, to Mission and will direct all research on screwworms. I have been assigned to the laboratory temporarily and will be in charge of field operations for the next 3-6 months.

Our entomologist who recently visited you, Mr. C. M. Jones, is in Puerto Rico and I have not been able to discuss his visit to Cotaxtla with him, but Mr. Erasmo Lopez tells me that you now have regional responsibilities that make it necessary for you to travel to Cd. Mante, Temps. from time to time. It so happens that we are interested in Mante as a possible location for field tests to be conducted this winter and I wonder if you know when you will be going to Mante again. If at all possible, I would like to meet you there so that we can discuss future cooperative tests.

With best personal regards to you and your associates, I am

Sincerely,

O. H. Graham
Research Entomologist
Acting in Charge

cc Dr. Meadows

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE 10/6/72

TO

Dr. O. H. Graham

- [ ] ACTION
- [ ] APPROVAL
- [ ] AS REQUESTED
- [ ] FOR COMMENT
- [X] FOR INFORMATION
- [ ] INITIALS
- [ ] NOTE AND FILE
- [ ] NOTE AND RETURN
- [ ] PER PHONE CALL
- [ ] RECOMMENDATION
- [ ] REPLY FOR SIGNATURE OF
- [ ] RETURNED
- [ ] SEE ME
- [ ] YOUR SIGNATURE

REMARKS

FROM

R. L. Harris

Kerrville

GPO : 1964 OF—742-059

FORM AD-514 (8-64)

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE: 10/6/72

Dr. O. H. Graham

- [ ] ACTION
- [ ] NOTE AND RETURN
- [ ] APPROVAL
- [ ] PER PHONE CALL
- [ ] AS REQUESTED
- [ ] RECOMMENDATION
- [ ] FOR COMMENT
- [ ] PREPARE REPLY
- [X] FOR INFORMATION
- [ ] RETURNED
- [ ] INITIALS
- [ ] SEE ME
- [ ] NOTE AND FILE
- [ ] YOUR SIGNATURE

REMARKS:

R. L. Harris

Kerrville

FORM AD-317A (2-54)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
WASHINGTON, D.C. 20250

OFFICE OF ADMINISTRATOR

September 27, 1972

Subject: Dedication of Screwworm Laboratory as a Texas Historical Site

To: R. O. Drummond, Location Leader
USDA Livestock Insects Laboratory
P. O. Box 232
Kerrville, Texas 78028

I appreciate your invitation of September 19 to attend the formal dedication of the old building located at Kerrville, which was known as the "Stink House" while at Menard, Texas. I would enjoy participating in this special occasion but unfortunately I had made prior plans for that week, which will take me out of the office until after October 20.

I would also like to have the opportunity to discuss your plans and ideas for a pilot test to determine if the horn fly can be eradicated. From the progress that your laboratory has made in rearing and sterilizing horn flies and in view of the high degree of suppression that can be obtained by the use of chemicals, it seems to me that an integration of the two methods of suppression should be effective in eliminating horn fly populations in isolated regions at reasonable cost.

E. F. Knipling

E. F. Knipling
Science Adviser, ARS
Room 205, National
Agricultural Library
Beltsville, Maryland 20705

RECEIVED
OCT 4 1972

October 2, 1972

Mr. Merrill D. Doyle
Chairman, Kerr County
Historical Society
1701 Park Street
Kerrville, Texas 78028

Dear Mr. Doyle:

I appreciated very much your invitation to participate in the ceremony designating the ARS Livestock Insects Laboratory a Texas Historical Site. We are, of course, delighted that you and your colleagues have seen fit to so recognize this Laboratory in such a meaningful and significant way. Certainly this recognition is most deserved when one realizes that the screwworm eradication program has had great significance in the Southwest.

Although I would like very much to be with you when the site is dedicated, I find that my previous travel commitments will make it impossible for me to accept.

Because of the significance of this occasion, I would like to have one of our senior staff members attend to represent me. Therefore, I am asking Dr. A. W. Cooper, Acting Deputy Administrator for the Southern Region, to contact you with regard to such representation.

Again, may I express my personal thanks and that of ARS and the Department of Agriculture for the recognition that you are giving to our Laboratory. With best wishes for a most successful dedication.

Sincerely,

T. W. Edminster
Administrator

cc: Mr. Rathbone
Dr. Cooper
Dr. Drummond

SOUTHERN REGION
U. S. Livestock Insects Laboratory
P. O. Box 232
Kerrville, Texas 78028

September 19, 1972

Subject: Dedication of Screwworm Laboratory as a Texas Historical Site

To: E. F. Knipling, Science Adviser
Room 205, National Agricultural Library
Beltsville, Maryland 20705

You will remember when you were here at the Livestock Insects Work Conference in July of 1971 we had a small awards ceremony that took place in front of the old "Stink House" located at the Kerrville Laboratory. At that time we were in the midst of going through the Texas Historical Society so that the building could be designated as a Texas Historical Site. We now have received the plaque that will be stationed next to the building and we are now making plans for a formal dedication of that building. We now know that Representative O. C. Fischer from this district will act as principal speaker at a dedication ceremony to be held on October 20. We are making an effort to invite all of the principals associated with the original screwworm research to be here at that time. You, Don Hopkins and R. C. Bushland are named on the inscription of the plaque.

May I take this opportunity to invite you to come to Kerrville to attend this dedication ceremony? We would be extremely pleased if you could arrive a day or so ahead of time so that we could discuss with you our plans and ideas that we presently have for a pilot testing of a horn-fly eradication program. We have some ideas for combining this program with a cattle grub eradication program. We realize that you have a busy schedule but hope that you can come to the Kerrville laboratory for this important occasion.

ROD

R. O. Drummond
Location Leader

cc:
O. H. Graham
J. R. Johnston
H. C. Cox
M. D. Doyle

O H Graham

October 11, 1972

Mayor M. C. Maxwell
1001 Donna Kay
Kerrville, Texas 78028

Dear Mayor Maxwell:

There will be a ceremony at the USDA, Agricultural Research Service, Livestock Insects Laboratory on October 20, at 2:00 PM. At this ceremony we will erect a plaque designating one of the laboratory buildings as a Texas Historical Site. This building has historical significance in that it was the original building, located first at Menard, Texas, and later at Kerrville, in which Dr. E. F. Knipling, Dr. R. C. Bushland, and Mr. D. E. Hopkins conducted their original research on the sterile-male technique which has been so successful in the eradication of the screwworm. The text of the inscription on the plaque is attached.

Congressman O. C. Fisher of this district will be the principal speaker at this ceremony. It is my pleasure to invite you to be present as a special guest at a brief dedication ceremony.

Sincerely,

Merrill D. Doyle
Chairman
Kerr County Historical Society

1 Enclosure

cc:
R. O. Drummond
O. H. Graham

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Sincerely,

Merrill D. Doyle
Chairman
Kerr County Historical Society

1 Enclosure

cc:
R. O. Drummond
O. H. Graham

USDA Animal & Plant Health Inspection Service
Veterinary Services
Screwworm Eradication Program
P. O. Box 969
MISSION, TEXAS 78572

September 13, 1972

Subject: Authorization to Fly in Program Aircraft

To: Files

This will authorize Dr. Hugh Graham, Screwworm Research Laboratory, to accompany a program aircraft on a flight to Kerrville, Texas on Thursday, September 14.

He will return on a flight scheduled for Saturday, September 16, from that vicinity to Moore AB, Mission, Texas.

M. E. Meadows, Jr.
Veterinarian in Charge
Animal Health

USDA Animal & Plant Health Inspection Service
Veterinary Services
Screwworm Eradication Program
P.O. Box 969
MISSION, TEXAS 78572

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M. E. Meadows, Jr.
Veterinarian in Charge
Animal Health

O C Fisher
South Texas Bldg
225-5511

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S
H

U.S. DEPARTMENT OF AGRICULTURE — SPEED-MEMO

TO: A.W. POESKE

FROM: O. H. GRAHAM
MISSION, TEXAS

PART NUMBER: 3

DATE: SEPT. 11, 1972

SUBJECT: AIR CONDITIONERS FOR PICKUP TRUCKS

MESSAGE

The 2 pickups that need air conditioners are:

1969 CHEVROLET 1/2 ton, V 16706, A139574, speedometer reading Sept 1, 34738

1971 DODGE 1/2 ton, V-18608, A 150000, speedometer reading Sept 1 — 16218.

In both pickups, the present radiators are inadequate for field test work in mountains and deserts of Mexico where we plan to run field tests next winter and spring and should be replaced with larger radiators before air conditioners are installed. Living insects will be transported as well as personnel, equipment and supplies.

SIGNATURE: O H Graham

REPLY

from
P.O. Box 986
MISSION, TEXAS 78572

to
USDA-ARS-Admin. Office
P.O. Box 267
WESLACO, TEXAS 78596.

SIGNATURE

DATE

(DESTROY THIS PART 3 UPON RECEIPT OF REPLY)

FORM AD-311(REV. 5-68)

Yours

P.O. Box 986
MISSION, TEXAS 78572

to

USDA - ARS - Cotton Office
P.O. Box 867
WESLACO, TEXAS 78596.

U.S. DEPARTMENT OF AGRICULTURE

SPEED-MEMO

PART NUMBER: 3

DATE: SEPT. 11, 1972

TO: A.W. POESKE
P.O. BOX 267
WESLACO

FROM: O.H. GRAHAM
P.O. BOX 986
MISSION, TX 78572

SUBJECT: APPOINTMENT — MR. HORACIO BAZAN

MESSAGE

at present time Mr Bazan is working for APHIS on an Excepted appointment (Temp.) NTE 700 hrs. This appointment was effective July 3. Since we will definitely need his services beyond November, what should be done to arrange a longer appointment? Can we work with CSC to get Mr Bazan on register? He has 4 yr. Voc ag, 1 yr Biology and 1 yr. General Science in high school, medical Corpsman training in Army and 1 yr. experience in McAllen Gen. Hospital

SIGNATURE: O H Graham

REPLY

SIGNATURE

DATE

(DESTROY THIS PART 3 UPON RECEIPT OF REPLY)

FORM AD-311(REV. 5-68)

(Taylor 12-13)

Form 171
Form 52

Horacio Bazan
Rio Grande City, Texas

Route 1 Box ~~122~~ 112
Tel 487-3648

---

age 28 Married, 4 children
Born Edinburg, Texas

under special qualifications & skills

High school graduate
4 years Voc agriculture
1 year Biology
1 year General Science

Raised on farm, not much experience with livestocks

— McAllen General Hospital - 1 yr 2 mo
2.94 1970 — Instruments Maintenance, Temporary
WB-3 ? 1972 — beginning July 3, "

Veteran U.S. Army 1965-67.
Medical Corpsman

(Register) Present appointment —
(Excepted appointment (Temporary)
NTE 700 hrs)

MINUTES OF THE BOARD OF TRUSTEES
OF THE SOUTHWEST ANIMAL HEALTH
RESEARCH FOUNDATION

August 26, 1972

The Board of Trustees of the Southwest Animal Health Research Foundation met at the Gunter Hotel, San Antonio, Texas, on August 26, 1972 at 10:00 A.M. Officers present were: Dolph Briscoe, President (on leave of absence); C. G. Scruggs, Vice-President (Acting President); John Hays, Vice-President; and T. J. Richards, Secretary-Treasurer. Trustees present were: Dr. Robert J. Anderson, Ernesto Beguerisse, V. A. Clements, Jr., Alvie Cole, Charles Fuller, Harry Jersig, Dr. G. Kendrick, Jr., Edwin Ketchum, T. A. Kincaid, Jr., Claude K. McCan, Harold Nelson, Octovio Ochoa Ochoa, Jerry Puckett, and J. H. Williams. Also present were personnel of United States Department of Agriculture, Texas Department of Agriculture, Texas Animal Health Commission, Texas Agricultural Extension Service, Oklahoma Commissioner of Agriculture, Oklahoma State Board of Agriculture, Representatives of Texas and Southwestern Cattleraisers Association, American National Cattleman's Association, Texas Sheep and Goat Raisers Association, Texas Farm Bureau, Texas Farmers Union, Texas State Grange, members of news media, and numerous cattlemen, a total of 70 people in attendance.

The meeting was called to order by Vice-President Scruggs. He introduced Dolph Briscoe as the next Governor of Texas and cited the progress the Foundation had made under his capable leadership. He also introduced Representative O. C. Fisher of San Angelo, Congressman from the 21st District of Texas.

Mr. Scruggs then announced the signing of the joint U.S.-Mexico screwworm eradication program to take place in Mexico City on Monday, August, 28th, by U.S. Secretary of Agriculture, Dr. Earl Butz, and Manuel Bernardo Aguirre, Mexican Minister of Agriculture, to be attended by Senator John Tower, Congressman Bob Price, representatives of SWAHRF, and others. Reviewing the activities of SWAHRF since 1962, he stated that this official signing of the joint program was the culmination of ten years work by the Foundation and the producers of Mexico, as represented by the National Confederacion de Ganaderos . He then introduced trustees Octavio Ochoa Ochoa and Ernesto Beguerisse representing Mexico on the Board of Trustees of SWAHRF.

Dr. E. E. Saulmon, Deputy Administrator, U.S.D.A., A.P.H.I.S., gave a brief summary of events leading up to signing of joint program: a feasability study was conducted; decision was made to convert surplus U.S. Military ships into fly plants during next year at an approximate cost of $2 million, to be grounded off the West Coast of Mexico at Salina Cruz. The Production of Sterile Flies will be from Salina Cruz and Mission plant to eradicate the fly from Mexico down to Tehuantepec, then discontinue production at Mission and use Salina Cruz production to maintain permanent sterile fly barrier zone. Plans are for a 5-year eradication program at a cost of $40 M with the cost ration of 80% to be borne by the United States and 20% by Mexico according to ratio of economic losses to the livestock industry of the two countries.

Mr. Scruggs introduced Dr. C. N. Husman who is now a consultant to the Foundation on plant construction since his retirement from U.S.D.A. Dr. Husman gave a brief report and answered questions of those in attendance.

Scruggs stated that the purpose of this meeting was to discuss the present Screwworm situation and to try to devise solutions to the problem. He pointed out that the program had already saved hundreds of millions of dollars to an industry consisting of 50 million head of livestock today, and he estimated we had achieved more than 90% eradication.

Dr. M. E. Meadows termed the current year of screwworm eradication program as "terrible," but said the outbreak had been predicted earlier. As of Thursday, August 24, a total of 51,606 cases had been confirmed in Southwestern United States with a breakdown as follows: Texas - 50,284, (224 counties): Oklahoma - 142; Arizona - 802; New Mexico - 370; California - 7; and Arkansas - 1. Dr. Meadows said the Mission plant was turning out 200 million flies per week with a production high of 235 million flies last week - 135 million more than the plant was designed for. Flies have had to be spread out too thin, therefore, decision was made to pull back to the over-wintering area of South Texas and wait for cold weather to bring relief. He stated that $8.2M had been budgeted for the current fiscal year including a $500,000 additional granted by Congress. He estimated that 90% of the cases were navel and man-made wounds, with 60% being attributed to navel cases. He said the dispersal level of flies would not be lowered during the winter months as in the past years if money can be made available. There followed a series of questions from those in attendance directed to the appropriate personnel for answers.

Scruggs then introduced Dr. R. C. Bushland, who has returned to Mission as an entomologist in the eradication program.

Dr. E. E. Saulmon spoke of the recent reorganization of the Department of Agriculture. He said the total budget for the program was $7.2M. last year with an additional $500,000 being transferred to the Southwest program, making a total of $7.7M. Inflation and other factors had made that amount inadequate to maintain full production rate of 200 million flies per week for the full fiscal year. He estimated that it would require an additional $2.2M to the amount already requested to assure maximum production for the full fiscal year.

Mr. Scruggs pointed out that the Foundation, due to its tax-exempt status as a non-profit organization, cannot lobby for the additional appropriation; but the appropriate organizations who composed the Foundation in the beginning could do so. There followed extensive discussion as to where the money should come from and best method to follow to secure the supplemental appropriation. This discussion was engaged in by Congressman O. C. Fisher, Dr. R. J. Anderson, Dr. E. E. Saulmon, T. A. Kincaid, William C. Donnell, John Cargile, Harold Nelson, and others. After much discussion, T. A. Kincaid MOVED, SECONDED by Edwin Ketchum, that the following resolution be adopted:

> In recognition of the international character of the threat of screwworms, and because of the present emergency; we hereby urge, in the strongest terms possible, all interested agricultural, livestock, and wildlife organizations to request of elected Representatives in the Congress, the National Executive Branch of Government, the animal health officials, and the Legislatures of the affected states sufficient funds to operate the U.S.D.A. screwworm fly production facility at Mission, Texas, at full capacity until such level of production is no longer necessary; and that any matching funds provisions be set aside.

We hereby also urge all interested agricultural, livestock, and wildlife organizations to immediately request of the Congress and the National Executive Branch of Government the necessary funds to fully implement and fund the now officially organized joint U.S.-Mexico screwworm eradication program in Mexico.

Be it known that the ultimate goal of these two actions is the total eradication of the costly screwworm from all of the United States and a greater part of the Republic of Mexico; and the establishment of a permanent sterile fly barrier zone at the Isthmus of Tehuantepec in Southern Mexico.

The resolution was PASSED unanimously.

After discussion, motion was MADE, SECONDED, AND CARRIED that Chairman C. G. Scruggs appoint an Executive Committee from its membership to conduct the affairs of the Foundation in the interval between the meetings of the Board of Trustees. The chairman named the following to compose the Executive Committee: C. G. Scruggs, John Hays, T. J. Richards, T. A. Kincaid, Jr., and Dr. Robert J. Anderson.

After discussion, it was the concensus of the Board of Trustees that a special study committee or "watch-dog" committee be composed to evaluate present program activities, review the long range plans for the United States, and review plans for the Mexican program in cooperation with the appropriate officers of the USDA with the view of anticipating unusual future needs of assistance by groups outside the technical program. Mr. Scruggs has named Dr. Robert J. Anderson, because of his technical knowledge of the program, to head up this committee.

Meeting adjourned.

'BLUE NORTHER' WELCOME

What Dr. M.E. (Cotton) Meadows needs money can't buy...he needs some cold weather.

For the lack of same in South Texas, says the director of the Southwest Screwworm Eradication Project at Mission--plus the natural abatement of the Gulf Coast ear tick epidemic in cattle--the insect pest is beginning to move north from the four-county area where it has been concentrated all year.

While the ear tick epidemic raged the flesh-eating screwworm fly didn't have to look further for the live meat it requires for its egg masses. But now that the tick has become inactive, livestock ears are healing up and the screwworm is having to look elsewhere for wounds on which to lay its eggs.

As an example, through October more than 50 per cent of the state's screwworm cases had been reported from Brooks, Hidalgo, Jim Hogg and Starr Counties, the first two tiers of counties north of the Rio Grande.

With the ear tick on the wane and no falling temperatures to discourage fertile fly migration, look what happened in November. During this period the number of cases reported from the "Big 4" counties dipped to about a third of the state's 2,740 infestations while the count in the nearby counties soared dramatically.

Jim Wells County, for instance, had 223 cases in November, more than twice its total in the previous 10 months combined. Webb County also doubled its total during the month. Kleberg County, with 125 in November, was up a little over 100 per cent and Duval County, which had 209 cases in the 30-day period, fell just short of doubling its year-long tally.

DRAMATIC UPSWINGS

In some of the sections further north the impact was even more dramatic. The first of the month San Patricio County had had six cases all year. By Dec. 1 its confirmed cases stood at 116. Live Oak and Bee Counties had increases of 344 and 800 per cent respectively.

The near-total lack of cold weather in South Texas was perhaps the major factor in making November the worst screwworm month of the year, an unprecedented occurrence. Not since the sterile fly program began 12 years ago has this month ever been the leader. Ordinarily November has less than 15 per cent of the annual cases. This time it was virtually a third. Cases in the month rose to 2,740 against 2,254 in October, usually one of the worst months.

During the '72 epidemic, cases declined 70 per cent from October to November.

Said Meadows: "When cold weather arrives in South Texas screwworms will be immobilized and die off, but not until. It's that simple. When you have as big a population build-up as we had this year they simply can't be overwhelmed by our sterile flydrops. We've got to have help from the weatherman."

And it has been a tough year in some areas. Both Brooks and Jim Hogg Counties have far surpassed their former records and Hidalgo, with 1,051 cases reported, has an outside chance of surpassing last years mark of 1,403.

On the other hand some South Texas counties which were so hard hit in '72 have almost escaped this time. Medina, which led the state a year ago with 2,733, has had only 50 to date. Kinney and Uvalde, which surpassed 2,500 each, are doing even better with 11 and 12 respectively in '73.

Elsewhere, Arizona continued its record-setting pace with 379 more, raising its count to 4,724, more than double the previous high established a year ago.

California also enlarged on a new mark with its worst November ever. Recording 38 more cases in the month, the Sunshine State saw its total rise to 224, well ahead of the old mark of 135 established in 1968.

New Mexico had only 49 new outbreaks as the winter weather buildup reduced cases to the point where producers there will likely be spared the unwanted new record that seemed possible only a month ago. There have been 1,124 cases in '73 compared to 1,447 10 years ago.

NON-SCREWWORM SAMPLES

Specimens received at Mission Lab which turned out to be another insect numbered 230 in November, the highest total for the month since 1968. No states set records for this type of submission.

STERILE FLY PRODUCTION

The production of sterile but sexually active flies dipped to 788-million from 840-million the month before, partially the result of a shorter month. Texas was showered with 464-million, about the same as October; and Arizona received 142-million, almost identical with its month earlier receipts. The Republic of Mexico was slashed heavily, getting 174-million as against 228-million in October.

-jlf-

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
VETERINARY SERVICES
FEDERAL CENTER BUILDING
HYATTSVILLE, MARYLAND 20782

Aug 18, 1972

Subject: Cost Comparison of Five Versus Ten Mile Flight Lanes.

To: J. L. Hourrigan
Senior Staff Veterinarian
Hyattsville, Maryland

At your request I have reviewed the cost comparison of 5 versus 10 mile flight lanes for releasing flies which was prepared by Mr. Kenneth C. Lattimore. Any comparison of costs must consider the comparative costs of using the C-45 versus the C-47. This bas been done by Mr. Lattimore.

There is no one absolute cost comparison. The comparative costs depend upon the number of flies released per square mile, the distance of the release area from Moore Field (deadhead time), whether the C-45 or the C-47 is used, and other factors. The number of miles flown during the actual release is exactly double. The deadhead time becomes an increasingly larger part of the time flown as the distance from Moore Field increases. Mr. Lattimore prepared three examples. They consisted of three areas, 10 miles, 100 miles, and 200 miles from Moore Field. The cost is a direct function of the time flown so that we can take the ratio of the comparative times to see what the comparative costs are. The ratio of elapsed times for 5 mile and 10 mile widths for the three areas are as follows:

Area	Ratio
1	1.53
2	1.39
3	1.37

The actual amount of increased flying time or cost will depend upon the mix of various factors specified above. As can be seen the increase in cost is 53 percent for the first area and 37 percent for the third area. Mr. Lattimore states that the average increased cost for all flying would be 33 percent. The reason being for the factors which he listed.

I feel that Mr. Lattimore's analysis is a realistic one. It is my feeling that the narrower flight width should be used when we have an expanding population of the type that exists in Texas at the present time. This opinion is based upon the data which Mr. Jack Graham has presented in his weekly activities report of May 2, 1972. I have discussed this data in my three memorandums of June 22 and 26, 1972.

If we have the restriction of a certain amount of total money available for production and flying then I feel that the number of flies per square mile should be reduced in order to permit increased flying. Since the cost of production is greater than that of release I do not feel that there would have to be a very great reduction in production.

DOUBTFUL

I feel that in the face of an expanding population 750 flies per square mile released in five mile flight lanes would be more effective than 1,000 flies per square mile released in 10 mile flight lanes.

I will be glad to discuss Mr. Lattimore's report and chart further with you and your staff.

Victor C Beal Jr

Victor C. Beal, Jr., Biometrician
Programs Planning and Development

JULY A SCREWWORM DISASTER

The month just completed was the worst July livestock producers have suffered through since the screwworm eradication program began back in 1962. It was nearly twice as bad, in fact, as the next worst. Bad as it was the epidemic wasn't confined to Texas alone. Both Arizona and Oklahoma were being simultaneously assaulted.

Arizona, where screwworms have been building for several months, had 258 cases, more than double its previous high for the month of 104 in 1968.

The Sooner state had the same sad tale, a month which doubled its previous record. The story in brief: 1972, 33 cases; 1962, 16. They were the state's first screwworm cases in nine years.

Although New Mexico didn't set any records this year, things were bad enough as it was. There were 124 confirmed outbreaks, a figure surpassed only by the 162 cases in 1963. New Mexico hadn't had a case in July since 1969.

California had only three infestations in July this year but, like New Mexico, they were its first cases during the period in three years.

Texas' situation is so bad as to be almost incomprehensible. The state recorded an astronomic 15,331 infestations last month. That's double the previous mark of 8,300 the first year the Screwworm Eradication Program was established at Mission, and an incredible 900 times worse than a year ago when a meager 17 cases were discovered.

In fact Texas' AVERAGE of 500 cases a DAY during July was higher than the total for any entire MONTH since 1962.

The live-meat-eating screwworm, struck during the month in 197 Texas counties, 16 in Oklahoma, 10 each in Arizona and New Mexico and two in California.

Hardest hit counties--all in Texas--were Gonzales with 526 cases; Dewitt 480; Kinney 448; Atascosa 443; Uvalde 441; Val Verde 418; Gillespie 410; Edwards 389; Wilson 369, and Goliad 362.

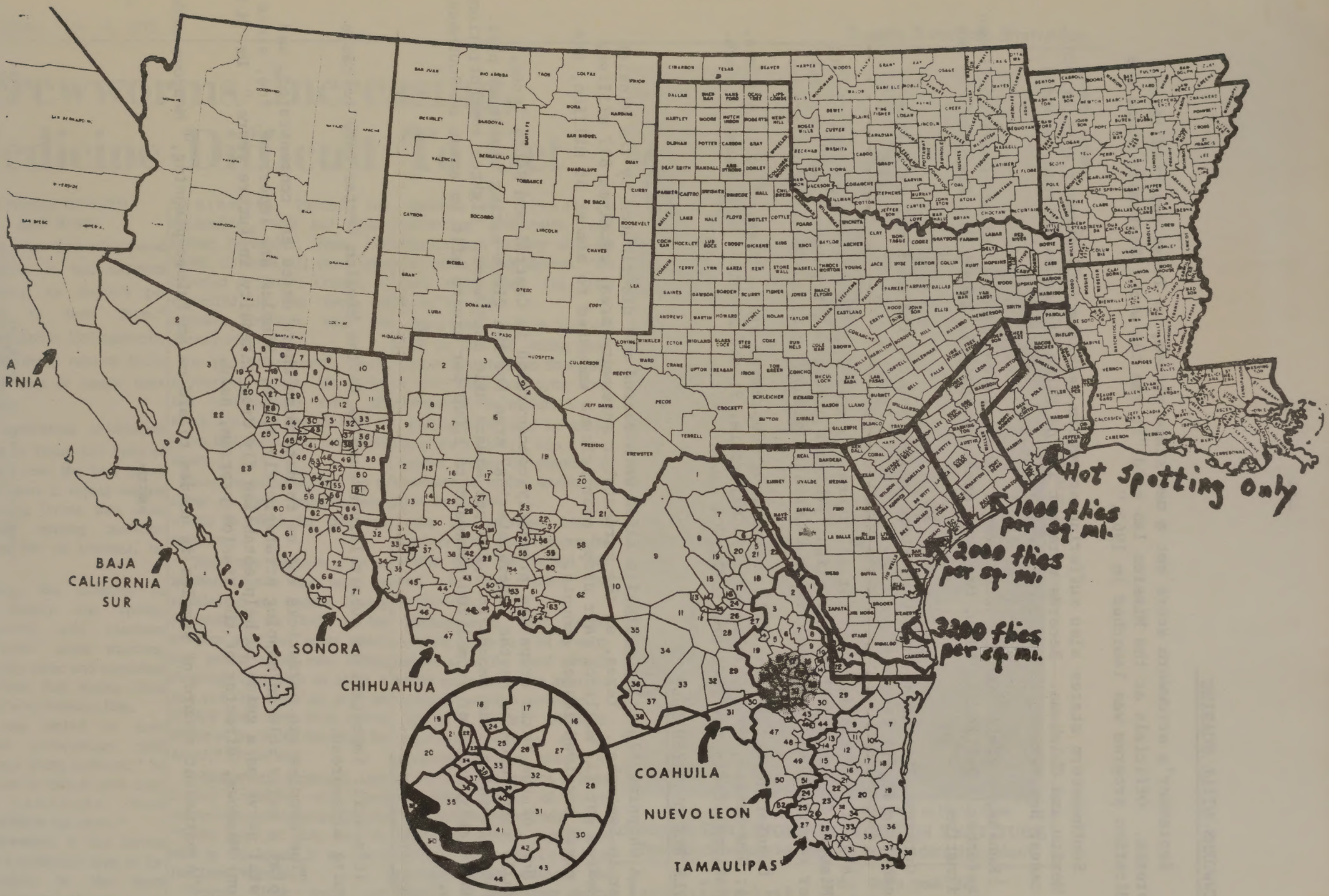
Twelve counties had more cases during July than they had ever recorded in an entire year previously. They were Bexar, Borden, Crane, Ector, Hall, Haskell, Lubbock, Mitchell, Oldham, Reeves, Shackelford and Yoakum.

Two counties--Hansford and Jasper--recorded their first cases ever during the month.

STERILE FLY DROPS

The Mission Center released 791,880,000 flies over seven states and Mexico. Texas got 662,248,000 and Arizona 69,266,000 to account for more than 90 per cent of the total.

STERILE FLY DISTRIBUTION PATTERN



SCREWWORMS STILL SOARING

September's screwworm score set a new state record, as Texas reported 16,882 outbreaks. Officials at the Mission lab said "it was the worst September since the eradication program was launched in 1962."

Southwestern states also suffering screwworm setbacks in September were Arizona, New Mexico and Oklahoma. Records were set in the three states as Arizona recorded 656 cases, New Mexico, 480, and Oklahoma, 476.

Kansas, a state traditionally free of the screwworm pest, had two cases confirmed in September. California added two more cases to its 1972 total, and Arkansas had one confirmation.

Outbreaks in the seven southwestern states boosted the national tally for September to 18,499 cases.

August case confirmation for all states totaled 19,147. However, officials at the Mission Center attribute the slightly higher case count for August to "generally better reporting of cases by livestock industry groups" that month than in September.

Cumulative totals for 1972 cases through September are: Texas, 71,651; Arizona, 1,564; New Mexico, 894; Oklahoma, 682; California, 9; and Arkansas and Kansas, 2 each. The national tally for 1972 now is 74,804 cases.

STERILE FLY DISTRIBUTIONS

A whopping 826 million sterile flies were reared and distributed by the Mission Center in September. Texas, as the hardest-hit screwworm area, received 617 million, and Mexico got 127 million. Air drops over Arizona amounted to almost 55 million, and other areas received lesser amounts.

Most of the Texas drops are presently concentrated in Central and South Texas, generally considered to be the "overwintering" area for the flesh-eating livestock pest. Heaviest concentrations amount to 3,200 per square mile each week. Lighter concentrations include weekly drops of from 1,200 downward to 1,000 per square mile in areas of Southeast Texas.

SAMPLES ARE SOUGHT

It's still important to submit larvae samples to the Mission Center even if cases are quite widespread.

"The samples are yardsticks for us to determine where cases are concentrated, and they play a major role in mapping strategic fly drops. Samples are important, too, since they will serve as a guide to help establish fly drop intensity in future years." Dr. M.E. (Cotton) Meadows, director of the Mission program, said.

"A permanent record of samples is needed to aid us in future planning," Meadows added.

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Screwworms Increasing, Medicine Difficult To Get

By HOLLY HUDLOW
Staff Writer

"When we first discovered screwworms in our livestock this spring, we couldn't get medicine to treat them," explained Archie Hollingsworth, a Travis County rancher living 10 miles west of Austin near Spicewood.

The screwworm eradication program in Texas had been so successful over the past seven or eight years at wiping out the flesh eating larvae that most companies making medicine had gone out of business, he said.

Recalling the situation in Travis County this spring, Hollingsworth said ranchers were "slack" about watching for the tiny nicks and scratches on livestock that makes them prey to the screwworm flies.

"No one looked or even suspected screwworms until they began losing livestock," he said. "And it didn't take long before ranchers found screwworms in full force."

A screwworm is the larvae stage of a particular type of fly that infests in the open untreated wound of any warm blooded animal. The female screwworm fly lays about 300 eggs at the edge of the wound and in about 12 hours the larvae hatches and begins feeding on the living flesh of their host.

Southwest. Through last September, Texas had 74,804; during September, Texas had 16,882. Of these, 114 cases were reported in Travis County, as compared to the hard hit southern counties such as Kinney with 630.

On the Hollingsworth ranch, 24-year-old Archie, his father and brother own some 400 sheep, 600 goats and 125 head of cattle that roam over their 5,000 acres.

Since the outbreak, they try to round up their livestock twice weekly to check for cuts and scratches.

"Right now we have a lot of newborn lambs that must be rounded up and treated. During September, we had a big problem with our goats which had gotten small cuts during shearing. That took us about a month to clear up and we always have new born calves hiding in the brush that must be found," Archie said.

Hollingsworth explained that finding animals with bad screwworm problems is difficult. "When they get sick, they go hide in the brush. If we don't find them, they die."

"People think we're not ranching when our animals die but its just hard to find them all," said Archie's father, Coke Hollingsworth, who has been ranching his land his entire life.

He figures 50 to 60 of the

Besides the livestock contracting screwworm, wild animals such as deer also are susceptible to the disease. "We can't catch deer and treat them," he said.

Since most ranchers lease out land in the fall during deer season, it hurts them financially to have their deer dying from screwworm, he explained.

Hollingsworth said he knows many ranchers who have stopped sending in samples of screwworms to the eradication plant in Mission.

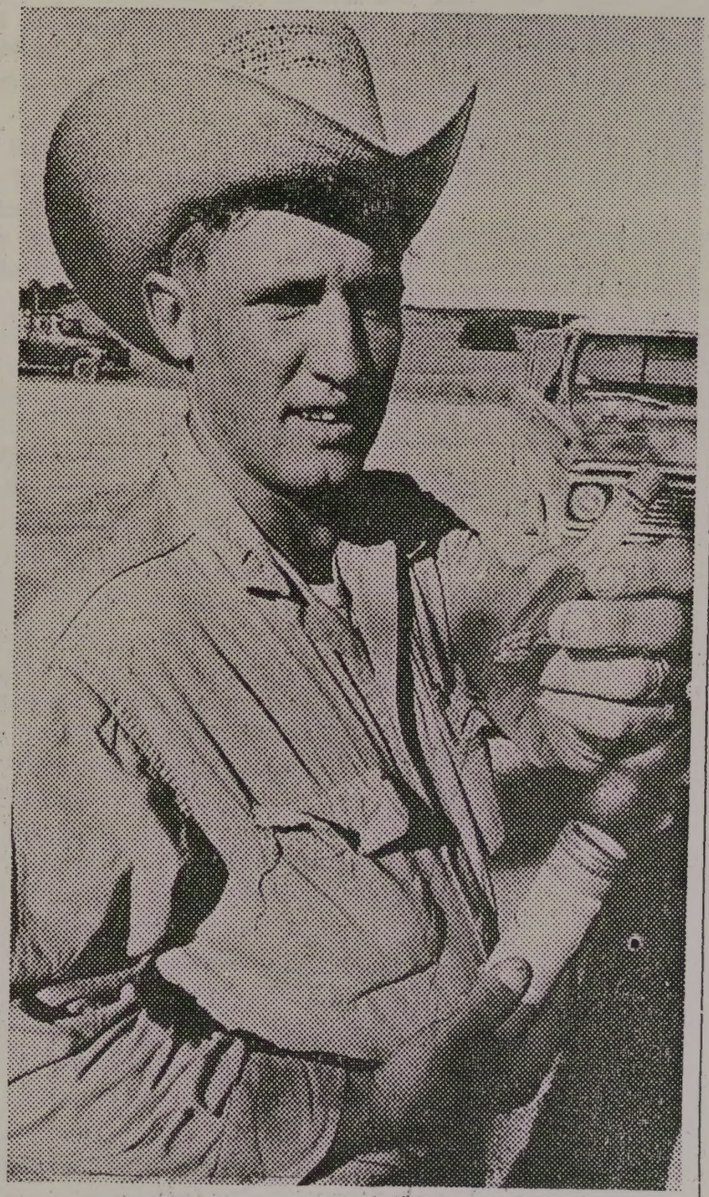
Kits are provided free to ranchers who must remove the worms from the animal and send to the plant for verification.

Hollingsworth said many ranchers figure its a lot of extra trouble since the plant already knows ranchers in the area are having screwworm problems.

Dr. M. E. "Cotton" Meadows, veterinarian-in-charge at the production plant at Mission, is urging livestock owners to keep submitting samples of worms found in livestock wounds.

He said without screwworm samples the eradication program cannot estimate the intensity of infestations in a given area and cannot release sterile screwworm flies in patterns that produce the best results.

"We are going to eradicate screwworms during the



Staff Photo by Duncan Engler

ARCHIE HOLLINGSWORTH HOLDS TEST TUBE
The specimens are sent to an eradication plant

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Recalling the situation in Travis County this spring, Hollingsworth said ranchers were "slack" about watching for the tiny nicks and scratches on livestock that makes them prey to the screwworm flies.

"No one looked or even suspected screwworms until they began losing livestock," he said. "And it didn't take long before ranchers found screwworms in full force."

A screwworm is the larvae stage of a particular type of fly that infests in the open untreated wound of any warm blooded animal. The female screwworm fly lays about 300 eggs at the edge of the wound and in about 12 hours the larvae hatches and begins feeding on the living flesh of their host.

In 1962, the Screwworm Eradication Program was begun to combat the growing problem in the Southwest. Male flies were sterilized at the plant while in the cocoon stage. They were then air dropped into areas of screwworm concentration where the sterilized male mated with the female screwworm fly causing the eggs not to hatch. By outnumbering the fertile males on the ground, the screwworms could be killed.

In 1968, the program had been so successful only four cases were reported in Travis County; and in 1971 there was only one reported case.

Then came the spring of 1972, after a mild winter that kept flies alive and breeding. There was plenty of rain, flowers bloomed as feed for flies providing an ideal environment for a screwworm outbreak.

This month the U.S. Department of Agriculture has confirmed 88,888 cases in the newborn lambs that must be rounded up and treated. During September, we had a big problem with our goats which had gotten small cuts during shearing. That took us about a month to clear up and we always have new born calves hiding in the brush that must be found," Archie said.

Hollingsworth explained that finding animals with bad screwworm problems is difficult. "When they get sick, they go hide in the brush. If we don't find them, they die."

"People think we're not ranching when our animals die but its just hard to find them all," said Archie's father, Coke Hollingsworth, who has been ranching his land his entire life.

He figures 50 to 60 of the Hollingsworth livestock have had screwworms this year. Although most have been cured, he has no count on how many.

His son, Archie, is a member of the Livestock and Range Committee which is an advisory committee to the county agricultural agent. Hollingsworth said that, although the epidemic is bad this year, "screwworms are not breaking the ranchers in Travis County, just causing them a lot of problems. Of course, you lose a baby calf and you are losing something financially."

send to the plant for verification.

Hollingsworth said many ranchers figure its a lot of extra trouble since the plant already knows ranchers in the area are having screwworm problems.

Dr. M. E. "Cotton" Meadows, veterinarian-in-charge at the production plant at Mission, is urging livestock owners to keep submitting samples of worms found in livestock wounds.

He said without screwworm samples the eradication program cannot estimate the intensity of infestations in a given area and cannot release sterile screwworm flies in patterns that produce the best results.

"We are going to eradicate screwworms during the overwintering period and will need accurate screwworm reports more now than ever," he said.

'I remember when the fly drop program first started," said Hollingsworth. "Ranchers didn't believe it would help."

But the program was so successful that for many years ranchers could virtually forget about the screwworm fly infesting their stock.

"Now we need to help the eradication plant by sending in samples and hoping they can help us next year," he said.

Staff Photo by Duncan Engler

ARCHIE HOLLINGSWORTH HOLDS TEST TUBE
The specimens are sent to an eradication plant

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Extra study due to bolster new attack on screwworm

By HOTY HAGER
Caller-Times Staff Writer

WESLACO — Intensive new field studies to determine competitiveness of sterile males and introduction of some new strains into the screwworm eradication program are planned for this winter.

Edgar Taylor, area director of the Agricultural Research Service of the U.S. Department of Agriculture, said the work is designed to prepare the international screwworm eradication program for a new attack "from a better position", on the destructive fly that attacks the Southwest's multimillion-dollar cattle industry.

Taylor said Dr. R. C. Bushlan originator of the sterile fly program with laboratory headquarters at Mission, has returned to the program from his assignment in the Metabolism and Radiation Research Laboratory at Fargo, N.D. Bushland symbolizes a "turnaround" in the U.S. Department of Agriculture attack on the screwworm fly which exploded this past summer into a major epidemic.

A special $80,000 allotment was made by the USDA to the field studies to be headed by Dr. Hugh Graham in connection with backup research by Bushlan.

Field men will study the screwworm in its habitat in Mexico and retrap sterile males to determine their competitiveness with the wild flies. At the outset these sterile males were 50 per cent effective, but their strength may not be as great today, Taylor said.

The introduction of three new strains of screwworms from Mexico in the laboratory production of 200 million sterile flies a week should improve their effectiveness, Taylor said. In any event the field tests will be pushed to determine effectiveness of the program before next spring when the new and more informed attack on the screwworm will be launched in the United States and Mexico.

Taylor said Mexican copperation in the program has been "excellent."

The long-range international attack on the screwworm includes installation of a floating sterile fly factory aboard a ship in the Bay of Compeche, Mexico, Taylor said.

Homecoming activities set

Hearing at A&I

Expanded Screwworm Program Pushed

MISSION (Spl)—Although the agreement between the United States and Mexico on a two-pronged attack against the screwworm from both the north and south is barely a month old, the assembly of key equipment is already well under way.

This information was revealed at a joint technical conference here attended by Animal and Plant Health Inspection Service (USDA) specialists, operating agencies from the U.S. and Mexico and livestock producers.

"The Mexico Program" (as it's usually referred to) calls for eradicating screwworms from Mexico by setting up a second sterile fly production plant in the republic similar to the one here and attacking the dread flesh-eating pest simultaneously from both ends of the country.

The southern operation will be established aboard three renovated surplus U.S. ships which will be beached at Salina Cruz on the Pacific Coast of the 130-mile wide Isthmus of Tehuantepec. The narrow isthmus eventually will serve as a permanent holding line against additional screwworm invaders from further south once the insect is eliminated from Mexico.

The three vessels, headed by World War II aircraft transport the SS Frank Flowers, have already been located and "frozen" for this purpose, according to Chester Husman, Kerrville, screwworm program pioneer who has come out of retirement to spearhead the acquisition effort. The Flowers will serve as the fly factory, the Star Reefer and Cape Canso in support capacities.

The craft are presently berthed at Beaumont and San Francisco.

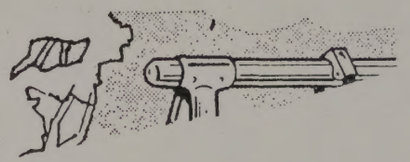
In addition to the ships Husman will have to acquire from somewhere 34 twin-engine airplanes and about 200 vehicles of various descriptions.

"We already have a line on some surplus planes, although nothing like as many as we need," he told the group. Fortunately, he still has some time. Refurbishing and towing the vessels to Salina Cruz, the most time-consuming chore, is budgeted for 18 months from the initial awarding of the contract.

Target date for the startup of sterile fly drops from there is the final quarter (April-May-June) of fiscal 1974.

A major piece of equipment Husman won't have to worry about is the Cesium 137 irradiator, in which the flies are sterilized before release. This highly specialized equipment has been ordered and is now under construction in New Jersey. It is being paid for by the South west Animal Health Research Foundation, Inc., a cattle men's organization which provided the impetus and initial financing for the screwworn program 10 years ago.

As for the screwworm itself the gathering heard from Dr. Dave Anderson, epidemiologist-in-charge of sterile fly distribution, that an experiment using two pens of goats with fresh shear wounds resulted in about 50 per cent more screwworm eggs on the unsprayed herd than the undoused with an approved insecticide. "Spraying apparently provides some repelling effect (to screwworm flies) he speculated cautiously. The expected egg masses laid the sprayed animals went most entirely unhatched, he noted.



DD12/L31-72 JUL 27 1972

Mr. Charles W. Mathews
Associate Administrator for Applications
National Aeronautics and Space Administration
Washington, D. C. 20546

Dear Chuck:

Attached is a proposal for a feasibility test of the use of remote sensing in screwworm eradication. This test would be conducted in Mexico as a joint effort between NASA and the Department of Agriculture on the United States side and in consort with the Secretaria de Agricultura and the Comision Nacional del Espacio Exterior of the Mexican Government. If successful, the test could lead to definitive arrangements to assist the joint Mexican-American campaign for the control of the screwworm fly in its program to eradicate this pest from all of Mexico.

Ing Padilla
Dr. Zapata

We have discussed the feasibility of this test with officials of the Animal and Plant Health Services, U. S. Department of Agriculture and believe that NASA can contribute to the presently planned program. If you concur with the proposal it is requested that the Office of International Affairs be asked to initiate the preliminary interagency and international arrangements for conducting the test.

Sincerely,
Original Signed By
CHRISTOPHER C. KRAFT, JR.

Christopher C. Kraft, Jr.
Director

Enclosure

cc:
NASA Hqs., Dr. Charles A. Berry, MM

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CONCURRENCES

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NASA FORM 1267 OCT. 68 PREVIOUS EDITIONS MAY BE USED.

ABSTRACT

A PROPOSAL FOR A FEASIBILITY TEST OF THE USE OF REMOTE SENSING IN SCREWWORM ERADICATION

This document contains a National Aeronautics and Space Administration (NASA) proposal concerning the use of remote sensing technology to support the U. S. Department of Agriculture (USDA) in its program of eradication of the screwworm fly. The current USDA program is directed at preventing reinfestation of the United States, which was cleared of overwintering populations of the fly in 1966. A future planned program includes fly eradication in a large part of northern Mexico.

As a prelude to the program, the NASA proposes to examine in concert with USDA, the feasibility of using remote sensing in the eradication effort. Studies would be limited to a defined test site within Mexico. Remote sensing would provide detailed environmental data of the test site. Simultaneous ground studies would relate insect ecology to collected sensor data. An analysis would determine the usefulness of remote sensors for detection of environmental factors conducive to the growth of insect populations. If test site studies are successful, such information could lead to a cost effective climatology system required for the major screwworm eradication effort. The basic science developed could lead to useful application in eradication of other insect pests which have similar morphological characteristics as the screwworm fly.

A PROPOSAL FOR A FEASIBILITY TEST OF THE USE OF REMOTE SENSING IN SCREWWORM ERADICATION

1. General

a. The screwworm fly has infested the tropical and temperate zones of North and South America and caused serious losses to livestock and wild animal life for over 125 years. The infested area extended from South Central Argentina and Chile as far north as Nebraska. The insect causes losses to warm blood animals by laying eggs in any open wound, no matter how small. The eggs hatch into larvae which eat deeply into the wound. If not detected and treated, the infected animal may die in a few days. Even after treatment the animal may be stunted, make slow weight gains, and be more susceptible to infection. The end result is increased cost of production, reduced income to ranchers and dairymen. In Latin America an additional problem is the simple fact that the result is a loss of an irreplaceable protein resource which is vital to human health.

b. Detection and treatment remained the only remedy to the problem until the late 1930s when a theory concerning the use of sexually sterile flies was developed. It was based on the fact that the female fly breeds only once in the life cycle. It was therefore theorized that if sterile male flies could be produced and seeded in the infested area for several generations, the fly population would disappear.

c. The theory was of minor practical value until 1951 when Cobalt-60 radiation sources were developed which provided a practical method of irradiating the larvae to produce sterile flies.

2. The Eradication Program in the United States

a. The eradication program in the United States was developed and carried out by the U. S. Department of Agriculture. The first area to be attacked was the Southeastern United States. Sterile flies were produced and distributed in the area by aerial seeding carried out by light aircraft. The problem was eliminated in the Southeast by 1959.

b. A similar program was launched in the Southwest United States in 1962. Sterile flies were produced at a new production facility at Moore Field, Mission, Texas, which was capable of producing 150 million flies per week. By 1966 the screwworm fly was eliminated from the United States.

c. The total cost of the eradication project in the United States was approximately 25 million dollars. It is estimated that the savings to the cattle and dairy industries amount to 120 million dollars annually.

3. The United States Barrier Program (Figure 1)

The elimination of the fly from the United States required a system for insuring against reinfestation from Latin America. To accomplish this task the Department of Agriculture together with the Mexican Government has established a barrier along the United States/Mexico border

extending into Mexico in some depth. In this barrier area sterile flies are continually seeded and ground checks made periodically by agents of a joint Mexican-American commission for the control of screwworms and by residents of the area to detect evidence of reinfestation. "Hot spots" are then heavily seeded to restrict the spread of the insect and to eliminate its source. This program is supported by the sterile fly production plant at Mission, Texas, and by aircraft assigned to the Department of Agriculture. The cost of the barrier is five million dollars annually and it must be maintained indefinitely unless Mexico is cleared.

4. The Mexico Eradication Program

a. A Mexico/United States survey to determine the feasibility of a screwworm eradication program throughout Mexico has been completed. A favorable report has resulted in a detailed program prepared by the United States Department of Agriculture. The project is proposed as an item in the Department's FY 1973 budget. It is estimated that the program will require four years, with the first year devoted to construction of a new production plant in Southern Mexico or equipping a facility aboard a ship. Seeding operations will then continue for two years, with the fourth year devoted to assessing results. The two year seeding period may be reduced considerably if techniques currently under study prove successful.

b. Once Mexico is declared free of the fly the current (United States/Mexico border) barrier will be suspended and a new barrier activated in Southern Mexico.

5. Use of Remote Sensing

a. General

During the past few years a program has been underway to develop earth survey techniques utilizing remote sensing from aircraft and from spacecraft. Resources which have been surveyed in this manner include definition of geologically important areas, coastal and estuarine areas, soils and soil moisture, crops, timber, land use, watersheds, sea state, transportation networks, etc.

b. What is Remote Sensing?

Remote sensing may be thought of as the gathering of information without actual contact with the object or area being investigated. The earth observations instrumentation which gather such information take advantage of the physical principle that all materials radiate or reflect electromagnetic energy and the radiant spectrum is unique for each material making it identifiable. Spectral regions which have received primary attention for earth resources work include the ultraviolet, visible, infrared, and microwave. Advanced photographic techniques are emphasized in the visible range; radiometers, spectrometers, and multispectral

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AÑO LVI — TOMO VI | FUNDADOR: RAFAEL ALDUCIN | DIRECTOR GENERAL: JULIO SCHERER GARCIA | MEXICO, D. F.—JUEVES 30 [

México, por el Plan de dar Servicio de Satélites Meteorológicos a Todo el Mundo

La utilización de satélites ra proporcionar información teorológica a países margi- dos de tal servicio fue apo- da ayer por México.

El ingeniero Javier Barrien- Esparza, subsecretario de municaciones y Transportes, lo expresó al inaugurar el minario del Grupo de Tra- jo de la Organización de las ciones Unidas y de la Or- nización Meteorológica Mun- al, que se inició ayer en el ditorio del Centro SCOP.

Agregó que si aquello se gra se resolverán agudos oblemas que afectan a los pueblos que no cuentan aún con ese servicio.

El funcionario manifestó, ante los representantes internacionales que concurren al evento, que con la realización de éste México reitera su entusiasmo e interés particular en el desarrollo de la meteorología, especialmente en la utilización del espacio extraterrestre para fines pacíficos, como la utilización de satélites meteorológicos.

En la reunión se señaló que debe haber un intercambio ideal sobre los aspectos más significativos de la tecnología espacial, entre todos los países e incluir entre éstos a los que han quedado marginados en la región del Caribe.

JAVIER BARRIENTOS Esparza, subsecretario de Comunicaciones y Transpo tes, inaugura el Seminario de la ONU y del Organismo Meteorológico Mundia

EL INGENIERO RAUL Higuera Mota, secretario de

También, ante los 96 delegados de los diversos países de Latinoamérica y agregados diplomáticos de Japón, Francia, Estados Unidos y de la República Federal Alemana, habló el ingeniero Raúl Higuera Mota, secretario de la Comisión Nacional del Espacio Exterior, dependiente de la Secretaría de Comunicaciones y Transportes.

En su intervención, indicó que uno de los aspectos más importantes, es que las técnicas surgidas de este simposio se extiendan a todos los países del mundo. Agregó que este evento marca un paso trascendental en el campo de nuestras actividades culturales.

Esto obedece a la presencia de técnicos y científicos y técnicos extranjeros y nacionales, que con su contribución propiciarán la libre expresión del pensamiento, al propiciar un intercambio fecundo de ideas sobre los avances más significativos de la tecnología espacial, sobre todo en la resolución de serios problemas en materia de meteorología.

Hablaron también los señores G. W. Kronebach y Vicent J. Oliver, asesor técnico de la OMM y director del Seminario, respectivamente, para expresar su reconocimiento xico y a la Secretaría nicaciones y Transpor su interés en la realiza Seminario.

Además, se refirier importancia de los para mejorar el cono sobre las ciencias de l fera y su aplicación p prácticos.

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scanners in the ultraviolet, infrared; passive radiometers, scatterometers and side-looking imaging radars in the microwave region. Data accumulated from these sources indeed give the scientific investigator "new eyes" in observing man's environment. While these new methods are in their infancy when used in applications to earth's problems, they are proving cost beneficial in several instances.

c. Remote Sensing in Public Health Application to Insects

During recent months considerable effort has gone into a new program of the use of remote sensing to define environmental conditions which contribute to the degradation of human and animal health. A major subject of study has been that of insects and arthropods important to man's well being. This has included one small project to study the ecology of the screwworm fly as a model for all pupating insects. From this preliminary survey it is believed that remote sensing can contribute materially toward understanding environmental conditions where this insect thrives. However, it is also evident that insufficient scientific information is available concerning the total environmental requirements for this particular insect. While some data is available in the literature such as optimum soil temperature desired by the pupal stage, a comprehensive ecological model must be further developed. For this reason it is believed that remote sensing and appropriate ground studies in a small test area is mandatory prior to initiating aircraft operations in support of a major eradication effort.

6. Climatology and the Screwworm Fly

a. Background

The USDA proposal to eradicate the screwworm fly from Northern Mexico is an ambitious project. However, in the southern and southwestern United States, it has been shown that by utilizing aerial drop technique vast areas can be covered quickly and liberated from this insect pest. In these eradication campaigns considerable gain was acquired by taking advantage of weather and climatological conditions which limited and defined more precisely the affected zone. In the first Florida campaign an unusually severe winter killed numerous insects and suggested that the program be initiated some months previous to planned sterile insect releases. In Mexico, weather conditions should be more stable. Instead of temperatures increasing in the spring latitudinally from south to north as in the southern United States, it is affected primarily by changes in altitude and rainfall the terrain varies from the tropical lowlands to a central plateau and extends to numerous high mountain peaks. Several major canyons and river valleys complicate the climatology as their waters flow from the central highlands to the coast.

Another factor which influences the insect life cycle concerns the predominance of rainy and dry seasons in much of Mexico. The eradication campaign planners will undoubtedly take advantage of these seasonal ground moisture conditions which may preclude the development of insect pupae, shorten the life of the adult fly and limit its ability to disperse and search for hosts

When working in the United States, planners received data from numerous weather stations available from the Weather Service. In addition, there were reports of soil moisture and other factors relating to crop production routinely reported to USDA. Within Mexico, the number of weather stations is materially reduced and climatological data reported from other sources is minimal.

From the above discussion it is reasonable to assume that additional detailed climatological data throughout Mexico is not only desirable but necessary to improve the cost effectiveness of the eradication program. Since it appears unlikely that sufficient detailed field reports will be available for planning purposes it will be necessary to either increase the number of observation points or to use some other method of gaining such information. Remote sensing technology might logically provide this data in a convenient format for operational use.

7. NASA Proposal

a. Test Site

It is proposed that NASA technology concerning the use of remote sensing be utilized to determine local climatology in a test site within Mexico. The test site would be selected for its varied altitude and environmental conditions which are conducive to the growth and study of the screwworm fly. It will be situated south of the current screwworm barrier drop zone to preclude the effects of sterile fly release on the naturally occurring population.

The USDA (Mexico City Office) has proposed a test site somewhere along Highway 86 between Ciudad Valles, Tps., and Rio Verde, S.L.P. (Figure 2). Final selection can be accomplished in the near future.

It is proposed that NASA aircraft overfly the test site prior to initiating detailed ground studies on the test insect. Additional overflights and collection of remotely sensed data would be undertaken at appropriate intervals as determined by the project manager and based primarily on data returned from the entomological and/or climatological ground truth team. Final analysis of test site results will determine the feasibility of its use in the major screwworm eradication campaign.

It is proposed that the test site also be the subject of ad hoc investigation by means of the Earth Resources Technology Satellite (ERTS). Staff members of the Health Applications Office, NASA, MSC, will be responsible for review of ERTS coverage of Mexico as it becomes available. It is anticipated that ERTS data will provide a fair amount of climatological information useful in the overall evaluation. Since the screwworm fly is a vigorous insect ranging over several miles in the course of his lifetime it is possible that ERTS material may be of sufficient resolution that aircraft data will not be required or its use may be materially curtailed.

b. Remote Sensing Instrumentation

The basic question to be answered if remote sensors are to be used is what are the highly reliable parameters that can be observed which relate to the environment of the screwworm. From previous experience, the factors that strongly influence the screwworm fly population are soil moisture, temperature, and vegetative cover. These items may be influenced by latitude and, in Mexico, variations may be affected primarily by altitude.

The basic types of aircraft remote sensing instruments to be used for measuring and recording the soil moisture, temperature, and vegetative cover are summarized in Figure 3 and spacecraft instrumentation in Figure 4.

c. General Working Arrangements

(1) A U.S. inter-agency working group (Figure 5) will be continued to complete technical details of the proposed joint effort to determine the feasibility of the use of remote sensing to assist in eradication of the screwworm fly.

(2) A general plan for organization is proposed in Figures 6 and 7.

(3) The Office of International Affairs, Headquarters NASA will coordinate with the Department of Agriculture and State to lay the necessary ground work for a cooperative international program between Mexico and the U.S. as described previously. They will attempt to expand current arrangements of the joint Mexican-American Commission for the Control of Foot and Mouth Disease and the Screwworm Fly (Figure 7) to include provisions for remote sensing as an adjunct effort. Due to the technical expertise in the U.S. Earth Observations Program it is expedient to assume that U.S. aircraft, spacecraft, and data processing facilities will be utilized in the test program. In this case it is highly desirable that appropriately trained Mexican nationals be invited to participate in total technical management of the remote sensing program. This might include entomology experts from the research staff of the Secretaria de Agricultura as well as remote sensing staff from the Exterior Space Commission. The Mexican Defense Ministry would necessarily become involved in the case of aircraft overflight. Working space for a small contingent can be arranged at the Manned Spacecraft Center.

(4) Upon completion of general agreements between the two countries there will be formed a Mexican-American Coordination Group (Figure 6) to promote harmony in the day to day operations of the program, to favorable publicize the results of goals achieved in the joint effort, and to contribute toward further programs between the two nations as appropriate.

(5) The day to day operational management of the remote sensing portion of the test site program is conceived primarily as a function of the Health Applications Office, (Health Services Division, Life Sciences Directorate, Manned Spacecraft Center, NASA) located in Houston, Texas.

This office is colocated within the Earth Observations Division, (Science and Applications Directorate) at the same center. From this position, health related functional programs are conducted and supported by the entire staff including aircraft and data processing facilities. Appropriate staff members of the U.S. and Mexican governments should be invited to participate in routine management of field operations and analysis as members of the Remote Sensing Operations Team. In this way the necessary interface can be maintained between cognizant agencies. If resident, on site participation cannot be arranged, regular meetings must be held to coordinate the various aspects of the program.

(6) NASA proposes to furnish jointly with the Mexican space agency through contractor support arrangement, some technical and scientific staff to complement the research effort within the test site (Figure 6). Specifically it proposes to provide the expertise required to accumulate "ground truth" information necessary to understand data gathered by aircraft or spacecraft. Operation of the test site would be the responsibility of the joint Mexican-American Campaign for Control of the Screwworm Fly which is now in existence as a sub effort of the Mexican American Commission for the Control of Foot and Mouth Disease. Further details on organization, personnel, and support will be resolved in meetings of the interagency task force and by agreement with the joint Commission.

d. Costs

(1) It is proposed that the costs of the feasibility tests be the joint responsibility of the affected agencies of both governments. Operation of the ground test site could be adjucated the same way as that currently being conducted by the joint Campaign for the Control of the Screwworm Fly. NASA (MSC) has already budgeted for some technical assistance to ground truth support for the test site.

(2) It is proposed that if U.S. aircraft and/or spacecraft are used, costs supporting the feasibility test operations be borne by NASA as well as data reduction and processing costs.

(3) The Mexican government should be asked to provide staff support and travel funds for those members assigned to work at the Houston project office. NASA can supply necessary work space and office supplies to support routine work requirements.

(4) Unanticipated costs are expected to be shared on a 50 - 50 basis or approved by participating agencies of the governments concerned.

(5) USDA is encouraged to detail sufficient technical staff to NASA (MSC) Houston to support routine operations of the Remote Sensing Operations Team and the test site within Mexico. Office space and routine support can be arranged within the Health Applications Office.

THE CURRENT U.S./MEXICAN BORDER BARRIER

FIGURE 1

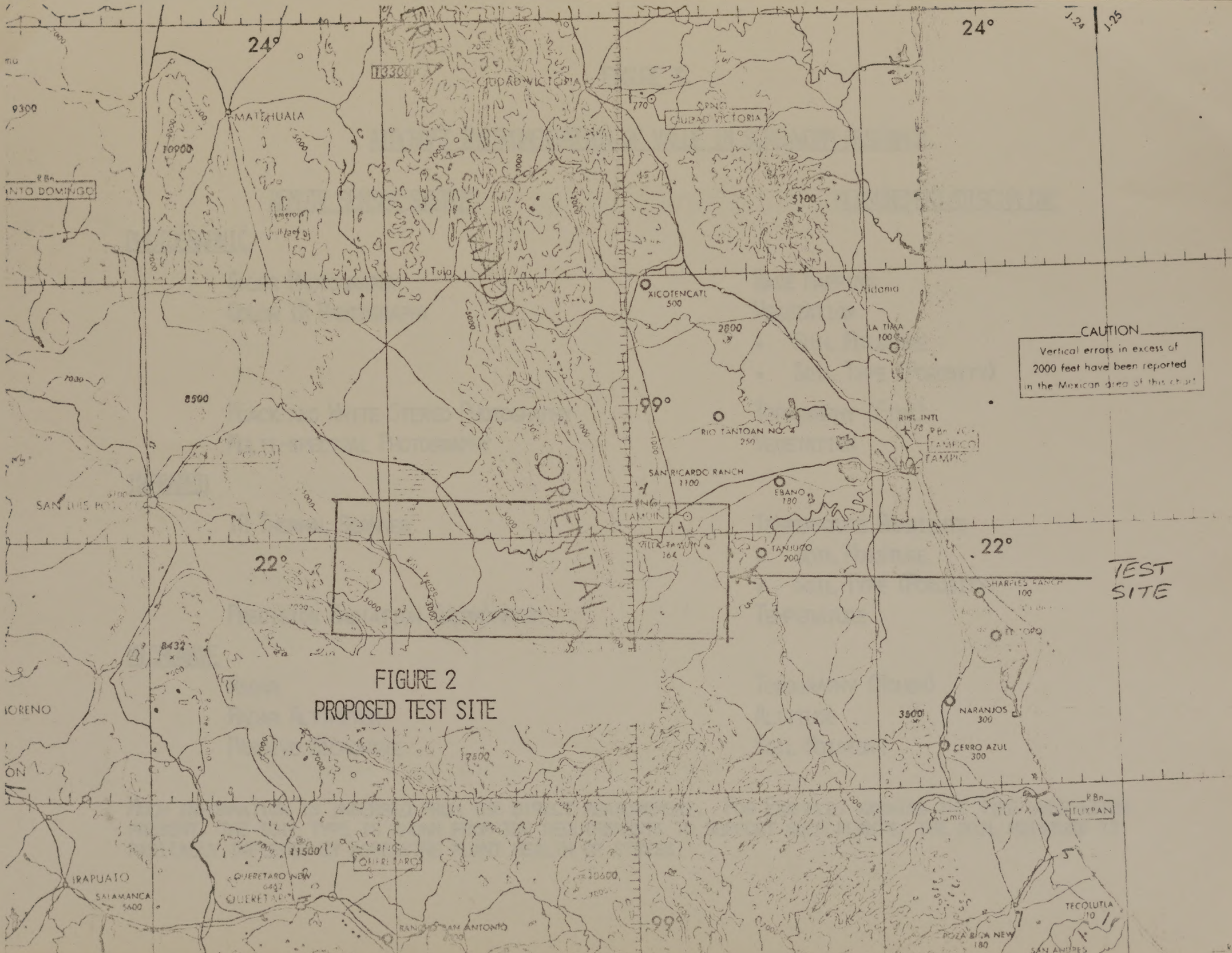

FIGURE 2
PROPOSED TEST SITE

FIGURE 3.

AIRCRAFT INSTRUMENTATION OF VALUE IN SCREWWORM RESEARCH

REMOTE SENSOR SYSTEM	MEASUREMENT/DISCIPLINE
PHOTOGRAPHIC	
Color Photography	Base Mapping
Color IR Photography	Vegetation • Soil Moisture • Soil Type (Porosity)
Black and White Stereo Photography	Topography (Fine)
Multi-spectral Photography	Vegetation
INFRARED	
IR Thermal Scanner	Temperature Gradients • Soil Moisture • Soil Type (Porosity)
Precision Radiation Thermometer	Temperature
MICROWAVE	
Radar	Topography (Rough)
Radar Altimeter	Altitude
Passive Microwave	Soil Moisture

Much information is inferred from the direct measurement. For example, knowing the type vegetation present, the soil type is known from the requirements to support such plants, the soil moisture is partially inferred by assessing plant health or stress.

FIGURE 4.

ERTS INSTRUMENTATION OF VALUE IN SCREWWORM ENVIRONMENT RESEARCH

RETURN BEAM VIDICON (RBV)

No. 1	.475	.575
No. 2	.580	.680
No. 3	.690	.830

MULTISPECTRAL SCANNER (MSS)

Channel 1	.5	.6	
Channel 2	.6	.7	
Channel 3	.7	.8	
Channel 4	.8	1.1	
Channel 5	10.4	12.6	(ERTS B only)

(Instantaneous Field of view 260 ft. x 260 ft.)

FIGURE 5.

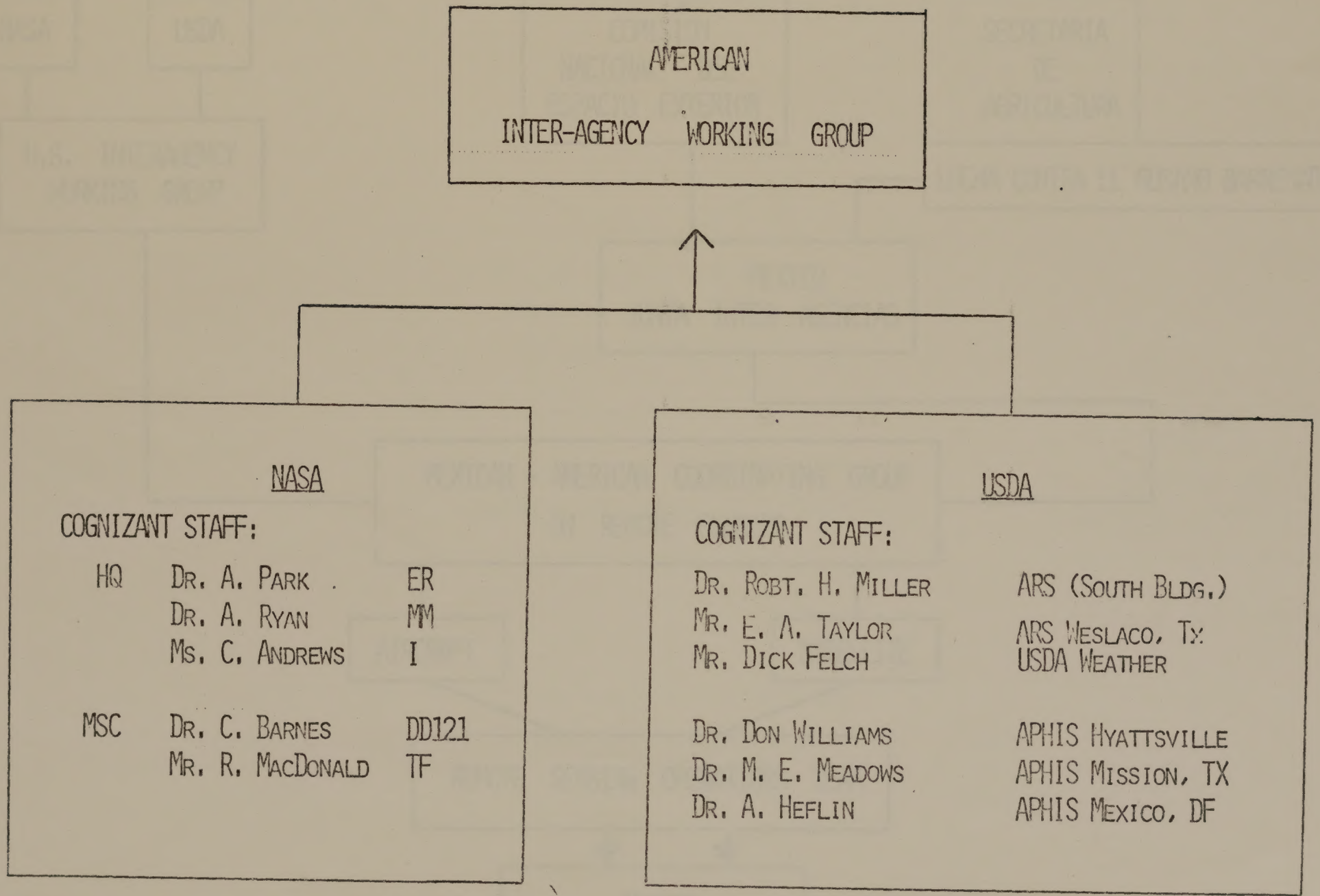
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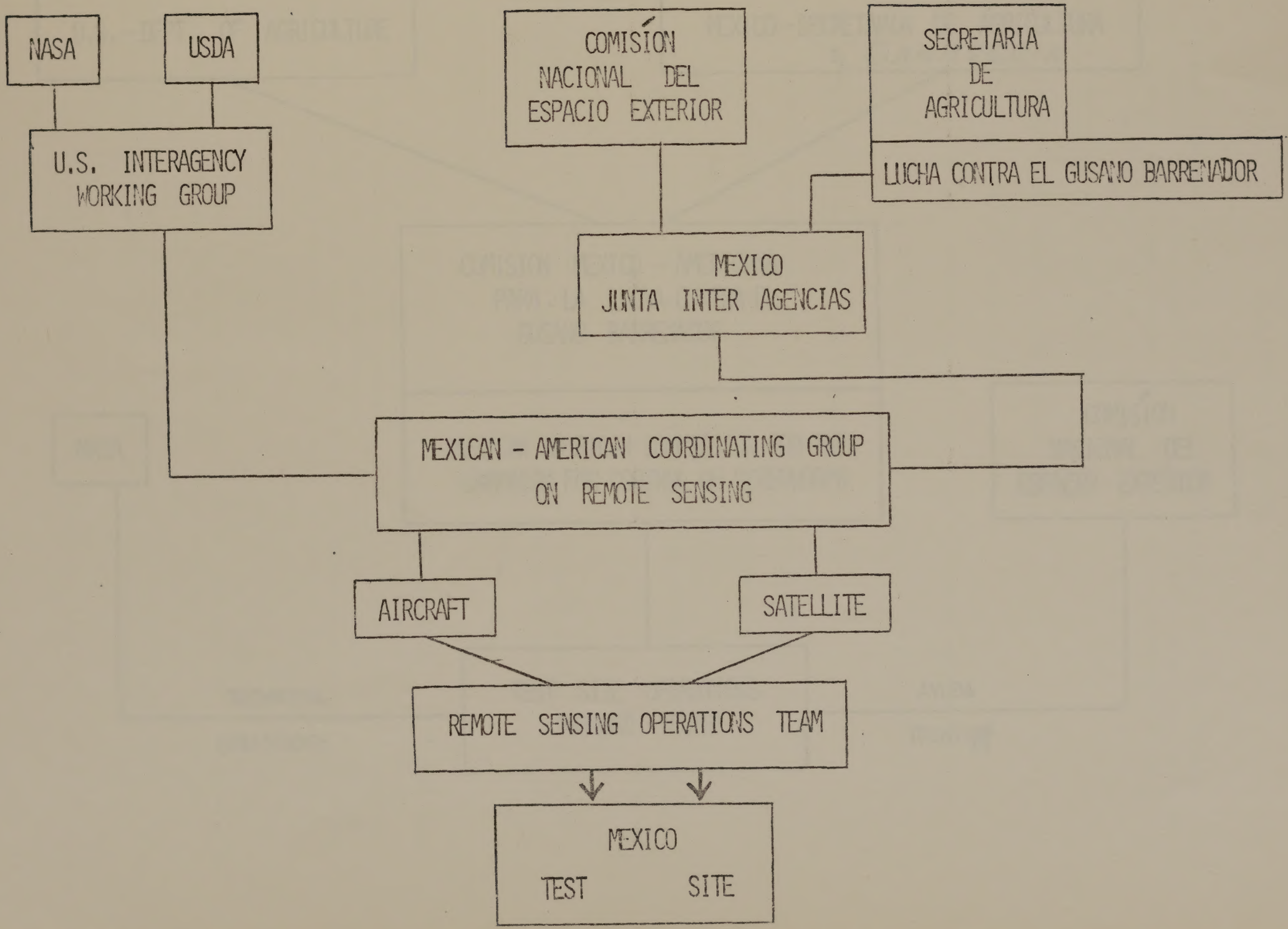
FIGURE 6.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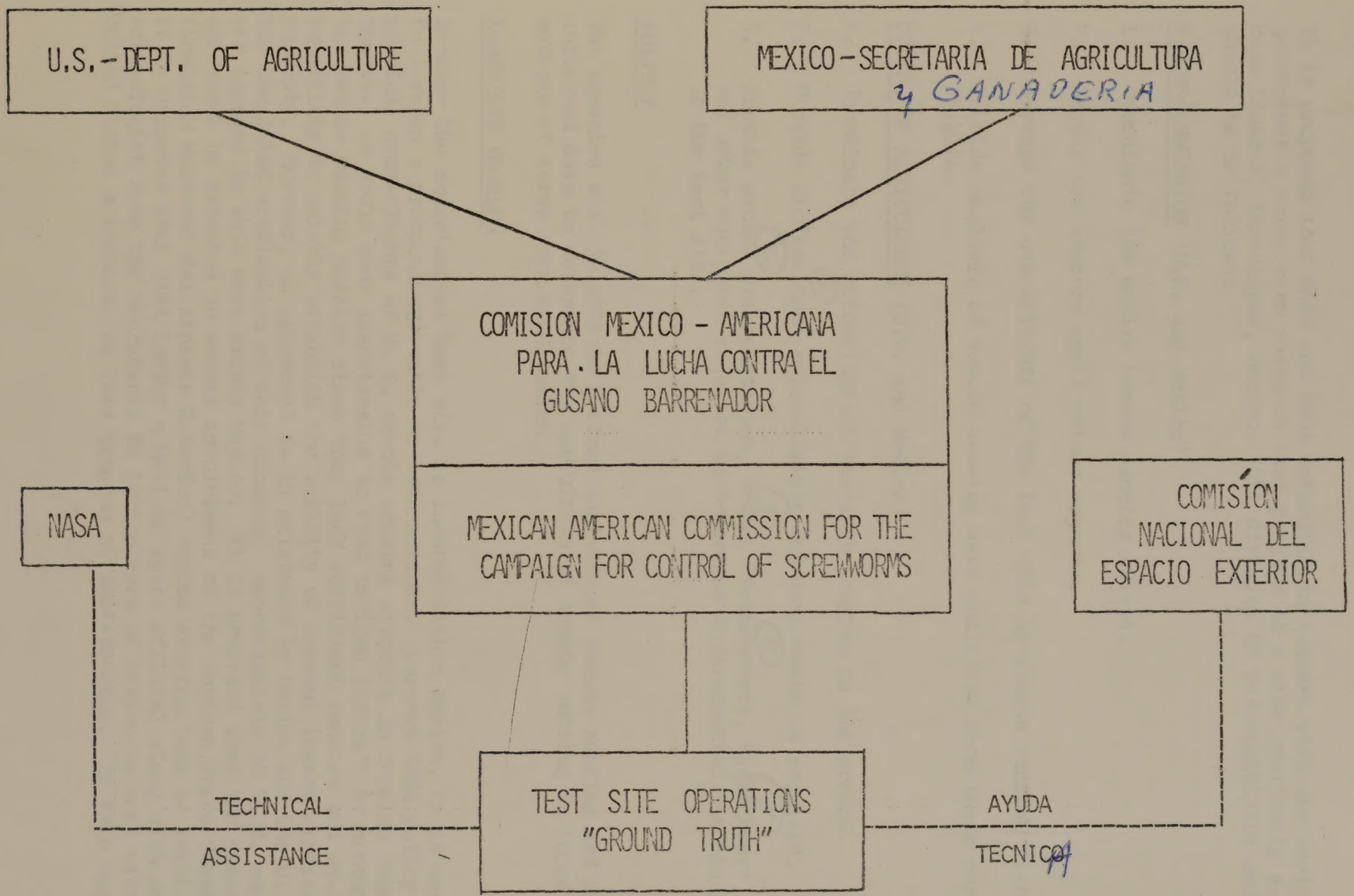
MEXICAN - AMERICAN COORDINATING GROUP ON REMOTE SENSING
AIRCRAFT
SATELLITE
REMOTE SENSING OPERATIONS TEAM
MEXICO TEST SITE

FIGURE 7.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MEXICAN AMERICAN COMMISSION FOR THE CAMPAIGN FOR CONTROL OF SCREWWORMS
NASA
COMISIÓN NACIONAL DEL ESPACIO EXTERIOR
TECHNICAL ASSISTANCE
TEST SITE OPERATIONS "GROUND TRUTH"
AYUDA TECNICA

A BRIEF PROPOSAL FOR A JOINT SCREW WORM RESEARCH EFFORT
NASA - USDA - MEXICO

It is proposed that NASA and USDA establish in concert with the Mexican government a screw worm research test program at a site previously selected near Linares, Tamaulipas, Mexico. The division of responsibility and effort should be as follows:

SPACE COMMISSION (U.S. and Mexico)

1. Coordinate the entire remote sensing effort.

2. Supply the sensors applications experts.

3. Arrange for over-flights of the test site by remote sensing aircraft.

4. Provide analysis of remote sensing data collected from these over-flights.

DEPTS. OF AGRICULTURE (U.S. and Mexico)

1. Coordinate the entomological research program on the ground.

2. Provide professional entomologists and assistants as required.

3. Provide ground transportation, traps, thermometers, hygrometers, and other equipment required to determine environmental conditions at the test site.

JOINTLY

The agencies will jointly do a final analysis of remote sensing and ground collected data to determine the usefulness of remote sensing in improving methods of screw worm eradication.

IMMEDIATE PROBLEM

Because the experimental test site is located within Mexico, it is necessary to develop a protocol agreeable to both nations. Current NASA policy may preclude over-flights of U. S. remote sensing aircraft in foreign countries. However, it would seem inadviseable to fund Mexican aircraft to accomplish the remote sensing mission since they lack sufficient sensors and analytical capability to quickly establish the validity of current insect eradication concepts. However, an agreement is in existence by Mexico and the U. S. for the joint eradication of this disease. Approximately 30 U. S. employees are engaged in this work within Mexico. It is proposed that the present agreement be extended to permit involvement of the Mexican Space Commission's (Comision Nacional del Espacio Exterior) remote sensing team as required. It is proposed that NASA invite a Mexican space official along with an entomologist from the Secretaria de Agricultura of Mexico to work with United States scientists in this program at NASA-Houston. In this way it

might be possible to develop an international team which would utilize a U. S. remote sensing aircraft for this project.

The approximate flying time from the U.S.D.A. experiment station, Weslaco, Texas, to the Mexican test site is 30 minutes and it is expected that no more than 3 or 4 over-flights per year would be required during the test program. Assuming success in the test schedule it might be feasible to utilize ERTS A satellite data for the actual eradication program which involves all of Mexico rather than the test site.

PRELIMINARY MEETING

Representatives of U. S. agencies affected by this proposal are invited to meet at the NASA Manned Spacecraft Center at 0900 on Monday, January 17, to discuss how this plan may be implemented. Meeting will be held in Room 860 , Building 2.

C M Barnes

C. M. Barnes, D.V.M., Ph.D.
DC71
Manned Spacecraft Center-NASA
Houston, Texas 77058
Tel. (713) 483-4251

B

National Program Staff
Beltsville, Maryland 20705

November 15, 1972

Subject: "Use of Remote Sensing in Screwworm Eradication"

To: R. H. Miller, Remote Sensing Coordinator, ARS

I am returning herewith the document which you sent with your reference slip dated October 26, 1972. I asked Dr. Bushland to review this document; his comments are as follows:

"Barnes has floated these all over ARS. I got one, so did Graham, so did Ed Taylor. I had to write a critique for Taylor to send in. I think that remote sensing to detect differences between arid conditions in which flies could not survive, and suitable habitats would help. Also since flies cannot fly at temperatures below 60°F, temperature sensing should be of help in mountain areas where Mexico has no weather stations. I don't know how much value to place on Barnes' ecological outline. If it doesn't cost too much it may be O.K."

My own view is that remote sensing can be of considerable value. However, I am concerned that we will give higher priority to cooperation with NASA than to meeting our own research needs. If there are any available funds to increase screwworm research, priority should be given to development and field evaluation of better strains. Also we should make a much greater effort to monitor the impact of released screwworms on the fertility of the wild populations. Attractants and traps need development. Screwworms produced from the artificial diet are not as robust as those reared in wounds. Obviously nutritional studies should be made to improve the diet and to evaluate the longevity, ability to withstand stress, and flight range of screwworms reared on various diets. These and other needs should be given priority over a major involvement in remote sensing.

Waldemar Klassen

Waldemar Klassen
Staff Scientist
Pest Management

cc:
L. S. Henderson
R. C. Bushland
E. A. Taylor
H. O. Graumann

B

~~Returns to Ed Jaffe~~

Copy for RCB OK

DRAFT:CMB:djm:11/6/72

STATEMENT

The USDA-ARS staff has read the NASA "Proposal for a Feasibility Test of the Use of Remote Sensing in Screwworm Eradication" and the report "Specific Operations of the Remote Sensing Operations Team (Proposed)" and wish to affirm the desire of the Agricultural Research Service (ARS), USDA, to cooperate with NASA in testing remote sensing in our screwworm eradication program. We agree to work toward the establishment of a cooperative work project at a test site in Mexico to determine the relation between remotely sensed variables and the ground observations of screwworm environmental factors. Such a site is planned to begin operations in January 1973 and continue to about June 1975 to allow thorough coverage of two complete annual cycles of screwworm infestation. Support of the operational phase of screwworm eradication program may begin as early as the sterile screwworm production facility at Tehuantepec is in full operation, provided that the feasibility has been demonstrated with studies made from the test site.

Work at the test site will be concentrated in the following tasks, which appear to be of most interest at this time. Density of screwworm flies as a function of time and physical variables will be measured by means of traps. The dynamics of infestation will be examined by means of wounded penned animals and other animals in the site. Life tables will be constructed to relate the life cycle of the screwworm to the physical variables.

Studies of local ecology will be made as needed and may require experimentation with native and sterile flies. Weather variables will be measured for correlation with entomological and remotely sensed data. These data may well indicate that other tasks are needed at the test site.

It is planned that ARS will furnish two entomologists or technicians from its staff for assistance with all phases of the entomological studies. If ARS does not have such persons available it will furnish at least two local nationals to help make collections from traps, take readings from weather stations, examine animals, and perform relatively unskilled tasks.

NASA is expected to furnish all costs of a qualified research entomologist from its contractor, the University of Texas. He will measure entomological and meteorological data for correlation with remotely sensed variables. ARS will work toward obtaining authorization from the Mexican government for him to work as a visiting foreign consultant in Mexico with all of the associated priviledges.

In support of the test site ARS has budgeted for and will furnish the equipment needed for field entomological studies. This will include approximately three pickup trucks, twenty fly traps, 35 micro weather stations, four pens, twenty sheep, and other field equipment that is relatively inexpensive. However, NASA will furnish a stereoscopic microscope for use of the entomologist in classifying trapped flies.

U.S. DEPARTMENT OF AGRICULTURE

REFERENCE SLIP

DATE 11/29/72

TO Hugh Chatham
Memorial

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REMARKS

Miss Jester says she thinks she sent you the proposal referred to. There copies for your signature to supplement our phone conversation.

Barbara

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